Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for determining an engine smoothness factor during an engine start event for an internal combustion engine in a vehicle having a hybrid powertrain that includes also an electric motor, a battery, a generator and transmission torque delivery elements that define, in part, power flow paths from the engine and the motor to vehicle traction wheels whereby the engine may be turned off during power delivery from the electric motor, the method comprising the steps of:

determining a first powertrain operating condition indicating whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

determining at least one of multiple additional powertrain operating conditions;

determining empirically at least one additional temporary smoothness factor as a function of the at least one of multiple powertrain operating conditions;

each additional temporary smoothness factor having a value indicating smoothness between maximum and minimum smoothness; and

selecting the determined temporary smoothness factor having a value corresponding to least smoothness ~~and latching it at that value~~ when the engine is in a start-up mode.

2. (Currently Amended) A method for determining an engine smoothness factor during an engine start event for an internal combustion engine in a vehicle having a hybrid powertrain that includes also an electric motor, a battery, a generator and transmission torque delivery elements that define, in part, power flow paths from the engine and the motor to vehicle traction wheels whereby the engine may be turned off during power delivery from the electric motor, the method comprising the steps of:

determining a first powertrain operating condition indicating whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

determining at least one of multiple additional powertrain operating conditions;

determining empirically at least one additional temporary smoothness factor as a function of the at least one of multiple powertrain operating conditions;

each additional temporary smoothness factor having a value indicating smoothness between maximum and minimum smoothness;

selecting the determined temporary smoothness factor having a value corresponding to least smoothness ~~and latching it at that value~~ when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the ~~latched~~ temporary smoothness factor and each selected engine operating variable.

3. (Original) The method set forth in claim 1 wherein the additional powertrain operating conditions include ambient temperature, low battery discharge power limit and low battery voltage.

4. (Original) The method set forth in claim 2 wherein the additional powertrain operating conditions include ambient temperature, low battery discharge power limit and low battery voltage.

5. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor, a battery, a generator and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine may be turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

measuring battery discharge power limit and determining a temporary smoothness factor as a function of the battery discharge power limit; and

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode.

6. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine may be turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

measuring battery discharge power limit and determining a temporary smoothness factor as a function of the battery discharge power limit;

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the latched temporary smoothness factor and each selected engine operating variable.

7. (Original) The method set forth in claim 6, wherein the multiple engine operating variables include engine speed command profile, engine throttle setting, fuel injection timing, engine spark timing and engine valve timing.

8. (Original) A method for determining an engine smoothness factor in an engine start event for an engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage and setting it to a value corresponding to reduced smoothness if battery voltage is less than a calibrated voltage value;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

determining battery discharge power limit and determining a temporary smoothness factor as a function of the battery discharge power limit; and

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode.

9. (Original) A method for determining an engine smoothness factor in an engine start event for an engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage and setting it to a value corresponding to reduced smoothness if battery voltage is less than a calibrated voltage value;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

determining a temporary smoothness factor as a function of a battery discharge power limit;

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the latched temporary smoothness factor and each selected engine operating variable.

10. (Original) The method set forth in claim 9, wherein the selected engine operating variables include at least one of a group of variables comprising engine speed command profile, engine throttle setting, fuel injection timing, engine spark timing and engine valve timing.

11. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage;

determining a temporary smoothness factor as a function of the battery discharge power limit; and

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode.

12. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage;

determining a temporary smoothness factor as a function of a battery discharge power limit;

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the latched temporary smoothness factor and each selected engine operating variable.

13. (Original) The method set forth in claim 12, wherein the multiple engine operating variables include engine speed command profile, engine throttle setting, fuel injection timing, engine spark timing, and engine valve timing.

14. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or

neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

determining a temporary smoothness factor as a function of a battery discharge power limit; and

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode.

15. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

determining a temporary smoothness factor as a function of a battery discharge power limit;

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the latched temporary smoothness factor and each selected engine operating variable.

16. (Original) The method set forth in claim 15, wherein the selected engine operating variables include engine speed command profile, engine throttle setting, fuel injection timing, engine spark timing and engine valve timing.

17. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature; and

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode.

18. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain

that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the latched temporary smoothness factor and each selected engine operating variable.

19. (Original) The method set forth in claim 18, wherein the multiple engine operating variables include engine speed command profile, engine throttle setting, fuel injection timing, engine spark timing and engine valve timing.

20. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor, a battery, a generator and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby

the engine may be turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a smoothness factor as a function of battery voltage;

determining battery discharge power limit and determining a temporary smoothness factor as a function of the battery discharge power limit; and

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode.

21. (Original) A method for determining an engine smoothness factor in an engine start event for an accelerator-controlled engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine may be turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring accelerator position and determining a temporary smoothness factor as a function of accelerator position;

measuring battery voltage and determining a smoothness factor as a function of battery voltage;

determining battery discharge power limit and determining a temporary smoothness factor as a function of the battery discharge power limit;

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the latched temporary smoothness factor and each selected engine operating variable.

22. (Original) A method for determining an engine smoothness factor in an engine start event for an engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode, and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring battery voltage and determining a temporary smoothness factor as a function of battery voltage;

determining battery discharge power limit and determining a temporary smoothness factor as a function of the battery discharge power limit; and

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode.

23. (Original) A method for determining an engine smoothness factor in an engine start event for an engine in a vehicle having a hybrid powertrain that includes an electric motor and transmission torque delivery elements that define, in part, integrated power flow

paths to vehicle traction wheels whereby the engine is turned off when engine torque and speed are not in a desired torque and speed relationship, the method comprising the steps of:

determining whether the vehicle is in a park mode or a neutral mode and initializing the method by determining a temporary smoothness factor depending on park or neutral selection and setting it to a value corresponding to maximum smoothness if the vehicle is in a park mode or a neutral mode;

measuring engine coolant temperature and determining a temporary smoothness factor as a function of engine coolant temperature;

determining a temporary smoothness factor as a function of the battery discharge power limit;

selecting the determined temporary smoothness factor with a value corresponding to least smoothness and latching it at that value when the engine is in a start-up mode; and

adjusting engine start smoothness using at least one engine operating variable selected from multiple engine operating variables, selection of the at least one engine operating variable being determined by a calibrated relationship of the latched temporary smoothness factor and each selected engine operating variable.